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(71) Applicant:
Delphi Technologies, Inc.
Troy, MI 48007 (US)

(72) Inventor:
Schiffmann, Jan Konrad
Newbury Park, California 91320 (US)

(74) Representative:
Denton, Michael John
Delphi Automotive Systems
Centre Technique Paris
117 avenue des Nations
B.P. 60059
95972 Roissy Charles de Gaulle Cedex (FR)

(54) **Vehicle attitude angle estimation using sensed signal blending**

(57) An attitude angle estimator and method of estimating attitude angle of a vehicle. According to one embodiment, an angular attitude rate sensor (12) senses angular attitude rate (13) of a vehicle, and an accelerometer (14) detects lateral or longitudinal acceleration (15). An attitude angle estimate (82) is produced and is updated as a function of the sensed angular attitude rate (13). An acceleration-based attitude angle (88) is determined as a function of the sensed acceleration (15), and a blending coefficient (92) is provided. A current vehicle attitude angle estimate (82) is generated as a function of the updated attitude angle estimate (82), the acceleration-based attitude angle (88), and the blending coefficient (92). According to a second embodiment, both a roll angle estimate (82) and a pitch angle estimate (84) are determined.

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EUROPEAN SEARCH REPORT

Application Number
EP 99 20 3361

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
A	DE 196 09 176 A (BOSCH GMBH ROBERT) 18 September 1997 (1997-09-18) * claims 1,6 *	1,4,5, 10,13-15	B60T8/00
A	US 5 610 575 A (GIOUTSOS TONY) 11 March 1997 (1997-03-11) * column 3, line 47 - line 57 * * abstract *	1,2,4, 10,11,13	
A	GB 2 314 187 A (AUTOLIV DEV) 17 December 1997 (1997-12-17) * page 3, line 24 - line 26 * * claim 6; figure 7 *	1,4-6, 10,13-15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.CI.7)
			B60T B60R
Place of search		Date of completion of the search	Examiner
THE HAGUE		12 September 2000	Colonna, M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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The members are as contained in the European Patent Office EDP file on
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12-09-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19609176 A	18-09-1997	WO 9733774 A	18-09-1997
		DE 59604260 D	24-02-2000
		EP 0883522 A	16-12-1998
US 5610575 A	11-03-1997	GB 2306036 A,B	23-04-1997
		JP 10504780 T	12-05-1998
		WO 9606418 A	29-02-1996
GB 2314187 A	17-12-1997	NONE	

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